Stewardship Report November 2019

Figures accurate as of November 2019

Emissions Reduction Alberta (ERA) reports on its activities on a quarterly basis. Figures are updated following each ERA board meeting. For detailed information on projects and funding opportunities visit ERAlberta.ca.

Christie Gamble, Director of Sustainability, CarbonCure.

CARBONCURE creates cleaner concrete with new technology

Concrete is the most widely used man-made material in the world and its key ingredient, cement, has a significant carbon footprint. It is the source of about eight per cent of the world's carbon dioxide (CO_2) emissions.

CarbonCure is setting out to change all that. The Canadian company has developed a technology that can be bolted onto existing cement plants, capturing greenhouse gas (GHG) emissions and locking them into concrete. CarbonCure is on a mission to reduce 500 million tonnes of CO_2 emissions globally per year, the equivalent of taking 100 million cars off the roads.

"CARBON UTILIZATION IS NOT JUST AN ABSTRACT IDEA. IT'S NOT JUST HAPPENING IN THE LAB, IT'S HAPPENING IN THE REAL WORLD.

"We are already building real things that we can live in and drive on every single day—overpasses, roads, buildings, airports, aquariums," said Rob Niven, Founder and CEO, CarbonCure Technologies.

ERA is investing $5 million into the project in the final phase of its Grand Challenge, allowing CarbonCure to expand its suite of carbon utilization technologies across Alberta's cement, concrete, and construction industry. They believe they can reduce 530,000 tonnes of CO_2 per year by 2030 in Alberta and save 554 million litres of water annually.

During the Grand Challenge, CarbonCure also secured an investment from Breakthrough Energy Ventures. The billion-dollar fund is backed by Bill Gates, Michael Bloomberg, and Jack Ma.

"The model being developed in Alberta will serve as a leadership example for other jurisdictions to decarbonize the cement industry while creating new economic opportunities," said Carmichael Roberts, Breakthrough Energy Ventures, in a letter to CarbonCure.

Mangrove Water Technologies Ltd. Facility

MANGROVE turns waste water into valuable chemicals and opens up $450 million opportunity

Carbon utilization technology from Mangrove Water Technologies has gone from a margarine container to a commercial solution in just five years.

Mangrove's innovative approach uses CO_2 to turn waste-gases into valuable chemicals and reduces water use in oil and gas operations. It has the potential to simultaneously significantly reduce emissions and conserve water, leading to economic and environmental opportunities for the oil sands mining industry.

Mangrove estimates an annual market of $450 million across the oil sands mining industry, with GHG reduction potential of 1.4 million tonnes of carbon dioxide equivalent (CO_2e) per year by 2030. This is equivalent to the annual emissions from over 300,000 cars. In Alberta alone, it is expected to save more than 11 billion litres of water, the amount required to fill 4,400 Olympic-sized swimming pools.

"WHAT EXCITES ME IS THAT WE ARE TREATING CARBON AS AN ASSET FOR FUTURE PRODUCTS, NOT A POLLUTANT.

"We've been working primarily with the oil and gas sector, but the technology can be also used in the production of lithium batteries. This allows us to play in traditional and future energy economies," said Saad Dara, Co-Founder and CEO, Mangrove Water Technologies.

Supported with a $5 million investment from ERA through its Grand Challenge, the technology will now be commercially demonstrated at a Canadian Natural Resources Limited mining site in Alberta.

"The Grand Challenge funding will allow us to fully commercialize our technology in Alberta and enable us to export the technology to other markets across the globe," said Dara.

GRAND CHALLENGE

Innovative Carbon Uses

Five years ago, ERA went looking for the world's most innovative technologies that turn carbon dioxide emissions from a waste stream into valuable products in Alberta.

The initiative was:

- Launched in 2013
- Included $35 million in funding
- Designed as a three-round, competitive process
- Targeted one net megatonne of GHG reductions annually.

Two successful projects, CarbonCure and Mangrove, emerged from Round 3 and will receive $5 million each to support commercialization in Alberta.

ERA

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COMMITTED TO ACTION

- ERA is a key partner in addressing Alberta's climate and economic priorities. We fund and de-risk late-stage technologies to reduce GHG emissions and help grow and create competitive industries in Alberta.
- In October 2019, ERA hosted its biennial conference, SPARK: Carbon Positive. Over three days, 600 innovators and investors came together to re-imagine carbon. Over 110 speakers and panelists participated. More than 73 per cent of event survey respondents identified new business opportunities as a result of attending.

CONVENING RESOURCES FOR COLLABORATION

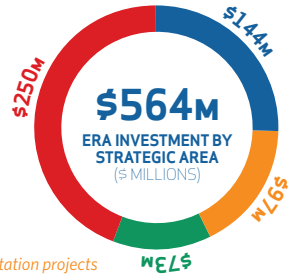
- The Government of Alberta provides grants to ERA. For 10 years, ERA has been investing revenues from the carbon price paid by Large Final Emitters (LFEs) to accelerate the development and adoption of innovative and clean technology solutions.
- We work with industry, government, and technology developers to make Alberta a hub for innovative ideas that reduce GHG emissions and improve economic competitiveness.
- We convene the resources—policy, regulatory, and business development tools—to be a catalyst and steward projects toward commercialization.
- With our stakeholders, we developed a Technology Roadmap that guides investment decisions and informs our portfolio mix.

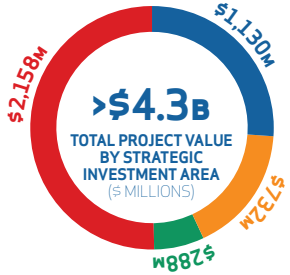
FUNDING OPPORTUNITY	WHAT'S IT ABOUT?	ERA FUNDING	HIGHLIGHTS
GRAND CHALLENGE	Technologies to transform CO_2 from waste to value	$34M	2 projects awarded $5M each in the final round
METHANE CHALLENGE	New methane detection and reduction technologies	$30M	12 projects funded worth $97M in total project value
OIL SANDS INNOVATION	Late-stage, GHG-reducing technologies to help Alberta's oil sands industry remain competitive	$61M	8 projects funded worth $795M in total project value
INDUSTRIAL EFFICIENCY CHALLENGE	Technologies to increase efficiencies for LFE industrial facilities	$69M	10 projects funded worth $308M in total project value
BEST CHALLENGE	GHG-reducing technologies in biotechnology, electricity and sustainable transportation	$92M	16 projects funded worth $421M in total project value
NATURAL GAS CHALLENGE	Unlocking innovation across Alberta's natural gas value chain	$50M	Application deadline is December 19, 2019. Successful projects will be announced in 2020.

INVESTING IN A DIVERSE PORTFOLIO

165 Projects

- Cleaner Oil & Gas (56 Projects)
- Low Emitting Electricity Supply & Demand (26 Projects)
- Food, Fibre, & Bioindustries* (44 Projects)
- Low Carbon Industrial Processes & Products (39 Projects)

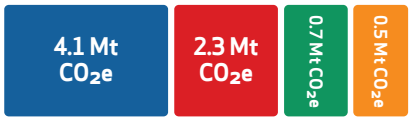




In 2012, ERA provided funding for three adaptation projects in consultation with Alberta Environment and Parks.

CUMULATIVE PROJECT EMISSION REDUCTIONS

7.6 Mt CO_2e Total by 2020



41.2 Mt CO_2e Total by 2030

Note: We have estimated emission reductions for all projects with approved funding commitments and executed funding agreements and assumed the projects will continue successfully and as planned. Should circumstances change for these projects, emission reduction estimates may change materially.

CUMULATIVE MARKET EMISSION REDUCTIONS

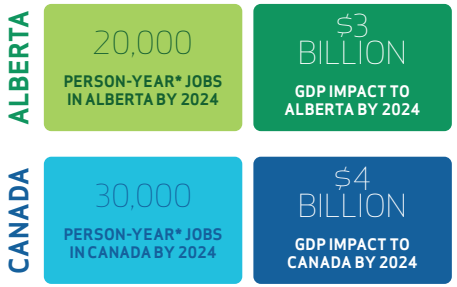
125 Mt CO_2e Total by 2030

- Venting & Wells
- Crude Oil
- Natural Gas
- Land Use
- Electricity
- Fuel Consumption
- Sulphur
- Other

ERA estimates our investments could result in emissions reductions of an average of 3.2 million tonnes of CO_2e per year. This is the equivalent of removing 679,000 cars off the road for one year.

LEVERAGING FUNDING AND CREATING JOBS

Technology is the engine of environmental and economic opportunity. For every ERA dollar we commit to advancing new technologies, over $6 has been invested by funding partners.



A person-year is equal to one-year of employment for one individual. Please note: economic impact is reported on a calendar year basis, not fiscal year.

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